

The opinion in support of the decision being entered today was **not** written for publication and is **not** binding precedent of the Board.

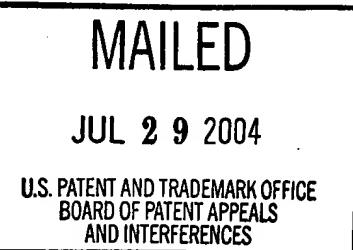
Paper No. 23

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DAVID C. CHAPMAN

Appeal No.2003-0174
Application No. 09/421,437



ON BRIEF

Before JERRY SMITH, DIXON, and GROSS, **Administrative Patent Judges**.
DIXON, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 1-6,10-35, 39-53 and 57-67. Claims 7-9, 36-38, and 54-56 are objected to by the examiner and indicated by the examiner as allowable if rewritten in independent form.

We AFFIRM-IN-PART.

Appellant's invention relates to an approach for routing an integrated circuit. An understanding of the invention can be derived from a reading of exemplary claim 1, which is reproduced below.

1. A method for automatically routing an integrated circuit, the method comprising the computer-implemented steps of:

receiving integrated circuit layout data that defines a set of two or more integrated circuit devices to be included in the integrated circuit;

receiving integrated circuit connection data that specifies one or more electrical connections to be made between the integrated circuit devices;

determining based upon the integrated circuit layout data and the integrated circuit connection data, a set of one or more routing indicators that specify a set of one or more preferable intermediate routing locations through which a routing path is to be located to connect first and second integrated circuit devices from the set of two or more integrated circuit devices;

determining, based upon the integrated circuit layout data, the integrated circuit connection data and the set of one or more routing indicators, the routing path between the first and second integrated circuit devices, wherein the routing path satisfies specified design criteria; and

updating the integrated circuit layout data to generate updated integrated circuit layout data that reflects the routing path between the first and second integrated circuit devices.

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The prior art of record relied upon by the examiner in rejecting the appealed claims is as follows:

Xiong 5,550,748 Aug. 27, 1996

Suzuki et al. (Suzuki), "A Practical Online Design Rule Checking System", **27th ACM/IEEE Design Automation Conference**, pp. 246-252, (1990).

Adler, T. et al. (Adler), "An Interactive Router for Analog IC Design," **IEEE**, pp. 414-420 (1998).

Claims 1-6, 10-20, 22, 24-35, 39-53, and 57-67 stand rejected under 35 U.S.C. § 103 as being unpatentable over Adler. Claim 21 stands rejected under 35 U.S.C. § 103 as being unpatentable over Suzuki. Claim 23 stands rejected under 35 U.S.C. § 103 as being unpatentable over Xiong.

Rather than reiterate the conflicting viewpoints advanced by the examiner and appellant regarding the above-noted rejections, we make reference to the examiner's answer (Paper No. 19, mailed Jun. 4, 2002) for the examiner's reasoning in support of the rejections, and to appellant's brief (Paper No. 16, filed Feb. 25, 2002) and reply brief (Paper No. 20, filed Aug. 12, 2002) for appellant's arguments thereagainst.

OPINION

At the outset, we note that appellant has elected to group the claims into seven groupings. (See brief at page 4.) We will select a representative claim from each group and address appellant's arguments thereto.

In reaching our decision in this appeal, we have given careful consideration to appellant's specification and claims, to the applied prior art references, and to the respective positions articulated by appellant and the examiner. As a consequence of our review, we make the determinations which follow.

In rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a *prima facie* case of obviousness. **See In re Rijckaert**, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993). A *prima facie* case of obviousness is established by presenting evidence that the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the references before him to make the proposed combination or other modification. **See In re Lintner**, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972). Furthermore, the conclusion that the claimed subject matter is *prima facie* obvious must be supported by evidence, as shown by some objective teaching in the prior art or by knowledge generally available to one of ordinary skill in the art that would have led that individual to combine the relevant teachings of the references to arrive at the claimed invention. **See In re Fine**,

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837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Rejections based on § 103 must rest on a factual basis with these facts being interpreted without hindsight reconstruction of the invention from the prior art. The examiner may not, because of doubt that the invention is patentable, resort to speculation, unfounded assumption or hindsight reconstruction to supply deficiencies in the factual basis for the rejection. See **In re Warner**, 379 F.2d 1011, 1017, 154 USPQ 173, 177 (CCPA 1967), **cert. denied**, 389 U.S. 1057 (1968). Our reviewing court has repeatedly cautioned against employing hindsight by using the appellant's disclosure as a blueprint to reconstruct the claimed invention from the isolated teachings of the prior art. See, e.g., **Grain Processing Corp. v. American Maize-Props. Co.**, 840 F.2d 902, 907, 5 USPQ2d 1788, 1792 (Fed. Cir. 1988).

When determining obviousness, "the [E]xaminer can satisfy the burden of showing obviousness of the combination 'only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in art would lead that individual to combine the relevant teachings of the references.'" **In re Lee**, 277 F.3d 1338, 1343, 61 USPQ2d 1430, 1434 (Fed. Cir. 2002), citing **In re Fritch**, 972 F.2d 1260, 1265, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992). "Broad conclusory statements regarding the teaching of multiple references, standing alone, are not 'evidence.'" **In re Dembiczak**, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir.

1999). "Mere denials and conclusory statements, however, are not sufficient to establish a genuine issue of material fact." **Dembiczak**, 175 F.3d at 999, 50 USPQ2d at 1617, citing **McElmurry v. Arkansas Power & Light Co.**, 995 F.2d 1576, 1578, 27 USPQ2d 1129, 1131 (Fed. Cir. 1993) .

Further, as pointed out by our reviewing court, we must first determine the scope of the claim. "[T]he name of the game is the claim." **In re Hiniker Co.**, 150 F.3d 1362, 1369, 47 USPQ2d 1523, 1529 (Fed. Cir. 1998). Therefore, we look to the limitations set forth in independent claim 1.

From our review of the examiner's rejection and the teachings of Adler, we find that the examiner has set forth a ***prima facie*** case of obviousness of independent claim 1. Appellant argues that Adler does not teach or suggest the last several steps of independent claim 1. Appellant argues that Adler does not teach the steps of "determining based upon the integrated circuit layout data and the integrated circuit connection data, **a set of one or more routing indicators that specify a set of one or more preferable intermediate routing locations through which a routing path is to be located** to connect first and second integrated circuit devices from the set of two or more integrated circuit devices" and "determining, based upon the integrated circuit layout data, the integrated circuit connection data and the set of one or more routing indicators, the routing path between the first and second integrated circuit devices,

wherein the routing path satisfies specified design criteria." (See brief at page 6.) We disagree with appellant, and find that Adler teaches the generation of multiple paths from a source to a target and then calculation of a minimum cost. (Adler at page 418, section 3.3.) Further, the calculation of layers and vias using two programs, GR and AR would have clearly been "preferable intermediate routing locations" as recited in independent claim 1. (Adler at page 417, section 3.1 and at page 418, section 3.4.) The examiner maintains that the basic principle and database of Adler at section 3.1 teaches the determination of one or more preferable intermediate routing locations. We agree with the examiner and find that the use of forbidden connections and use of flags is a means of determining that all other connections are preferable. Furthermore, the examiner maintains that the determination of a minimum cost path (Adler at page 418, section 3.3) is a determining of routing path that satisfies specified design criteria. (See answer at page 5.) We agree with the examiner.

Appellant argues there is no determination of intermediate routing locations or points of any kind through which a routing path is to be located. (See brief at page 6.) We disagree with appellant and find that all the paths are made of intermediate points through which the routing path is to be located. Therefore, this argument is not persuasive. Appellant argues that the final routing of Adler is not a set of one or more intermediate routing locations through which a routing path is to be located. (See brief

at page 7.) We disagree with appellant and find that appellant appears to be interpreting the limitations in the claim to encompass an “on-the-fly” determination of routing path. (See brief at page 10 with respect to claim 16.) We do not find that the language of independent claim 1 requires such an interpretation. Therefore, this argument is not persuasive. Appellant argues that the forbidden directions for wave propagation for point “a” in Figure 6 do not indicate locations through which a routing path is to be located. While we agree that these forbidden relative directions for a specific point do not specify a specific point of routing, they do make all the other points “preferable.” Therefore, the routing paths determined are “a set of one or more preferable intermediate routing locations” until the cost analysis is performed and the routing path of least cost determined. Therefore, this argument is not persuasive.

Appellant argues in the reply brief that the examiner has improperly read limitations from the specification into the claims. (See reply brief at page 1-3.) We do not understand this argument since this would theoretically further limit appellant’s claims to distinguish the claims. Therefore, this argument is not persuasive. Here, we find that the examiner’s claim interpretation merely shows the greater breadth of the claim limitations than appellant may have intended. Appellant reiterates the similar arguments as made in the brief which we did not find persuasive. (See reply brief at page 3-5.) Therefore, this argument is not persuasive, and we will sustain the rejection

of independent claim 1 and claims 2-6, 11-15, 19, 20, 24-35, 40-44, 48, 49, 53, 58-62, 66 and 67 which appellant has elected to group therewith.

CLAIM 10

Appellant argues that routing path is routed from the second integrated circuit device to the first integrated device. (See brief at page 8.) The examiner maintains that the language of claim 10 is directed to routing from a first to second integrated circuit and that Adler suggests both routing direction paths. (See answer at page 17.) We agree with the examiner that determination of routing path cost may be in either direction. Furthermore, we find that cost analysis of multiple routes to determine the least cost meets the limitation of determining routing path wherein the routing path is routed from the second integrated circuit device to the first integrated circuit device. Additionally, we find the labels of first and second integrated circuits and routing from the second to the first integrated circuits to be merely non-functional labels which may be assigned arbitrarily to the circuits. Therefore, this argument is not persuasive, and we will sustain the rejection of dependent claim 10 and claims 39 and 57 which appellant has elected to group therewith.

CLAIM 16

Appellant argues that design rule checking is conventionally performed on the entire layout and that claim 16 requires an “on-the-fly” design rule checking on one or more portions of the routing path as the routing path is being determined. (See brief at page 10.) We agree with appellant that claim 16 recites a checking during routing path determination. The examiner maintains that “routing procedures vary, and one of ordinary skill in the art knows that it is more prevalent to supply a router with design rule criteria and then perform the routing.” (See answer at page 20.) Rejections based on 35 U.S.C. § 103 must rest on a factual basis with these facts being interpreted without hindsight reconstruction of the invention from the prior art. The examiner may not, because of doubt that the invention is patentable, resort to speculation, unfounded assumption or hindsight reconstruction to supply deficiencies in the factual basis for the rejection. **See In re Warner**, 379 F.2d 1011, 1017, 154 USPQ 173, 178 (CCPA 1967), **cert. denied**, 389 U.S. 1057 (1968). Here, the teachings of Adler alone are broad and the examiner has resorted to unsubstantiated supposition in the rejection. Therefore, we find that the examiner has not established a ***prima facie*** case of obviousness supported by Adler alone, and we will not sustain the rejection of dependent claim 16 and claims 17, 45, 46, 63, and 64 which have similar limitations.

CLAIM 18

Appellant argues that Adler discloses design rule checking generally, and does to teach or suggest performing selective design rule checking on an extended portion of the routing path as the routing path is being generated. (See brief at page 11.) The examiner maintains that Adler teaches the prolongation or extension of a path and that “[i]n Adler design rule checks are continuously done” (answer at page 20), but the examiner provides no express support for this position. Therefore, as above with claim 16, we will not sustain the examiner’s unsupported rejection of claims 18, 47 and 65.

CLAIM 22

The examiner maintains that Adler at 2.2-2.4 teaches the claimed method and the design rule violations are avoided by defined connectable points on the edges of S and T. (See answer at pages 20-21.) We agree with the examiner that the language of independent claim 22 merely recites that the points have design criteria and that the connectable points satisfy the design criteria. Therefore, appellant’s argument is not persuasive, and we will sustain the rejection of independent claims 22 and 51.

CLAIM 21

Appellant argues that Suzuki does not teach or suggest selectively changing one or more values defined by design criteria over time with respect to a layout object.

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(See brief at page 12.) The examiner maintains that since Suzuki teaches an iterative process that this teaches and fairly suggests the claimed invention. We disagree with the examiner and find that the examiner has not addressed the limitations of independent claim 21 where the design criteria are changed over time. Therefore, the examiner has not established a *prima facie* case of obviousness, and we will not sustain the rejection of independent claims 21 and 50.

CLAIM 23

Appellant argues that Xiong does not teach or suggest the limitations of independent claim 23. (See brief at page 14.) We agree with appellant. The examiner maintains that the process of setting a net length constraint to the length of the longest routed path meets the limitations of the claim. We disagree with the examiner since this would not be a “portion of the routing path.” Therefore, we find that the examiner has not established a *prima facie* case of obviousness supported by Xiong alone, and we will not sustain the rejection of dependent claims 23 and 52.

CONCLUSION

To summarize, the decision of the examiner to reject claims 1-6, 10-15, 19, 20, 22, 24-35, 39-44, 48, 49, 51, 53, 57-62, 66 and 67 under 35 U.S.C. § 103 is

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affirmed, and the decision of the examiner to reject claims 16, 17, 18, 21, 23, 45, 46, 47, 50, 52, 63, 64, and 65 under 35 U.S.C. § 103 is reversed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART



JERRY SMITH
Administrative Patent Judge

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BOARD OF PATENT
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AND
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JOSEPH L. DIXON
Administrative Patent Judge

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ANITA PELLMAN GROSS
Administrative Patent Judge

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JLD/dpv

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HICKMAN, PALERMO, TRUONG & BECKER, LLP
1600 WILLOW STREET
SAN JOSE, CA 95125-5106